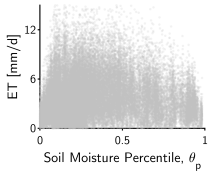
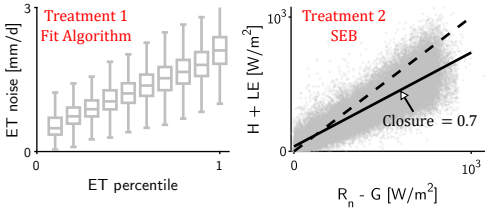
Step 1. Control Eddy Covariance Data Uncertainty

a) General Filtering for All Assumptions

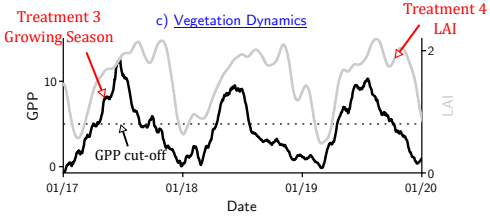


LE, H, R_n, GPP > 0
$T_a > 5°C$
$VPD_a > 0.5kPa$
RH $< 95\%$
Remove 48 hrs after rain
Observed or HQ gapfill

b) Noise and Bias



c) Vegetation Dynamics



Step 2. Specify Model to Detect Stress

Treatment 8: VPD
Treatment 5: Gc Eqn.

d) PMOC Model Structure

$$G_c = f(\overline{VPD}, GPP, C_a; \mathcal{P}) \text{ (Eqn. 1 or 2)}$$
$$ET = f(G_c, VPD_a, R_n, G_a, T_a, P_a) \text{ (Eqn. 3)}$$

e) Fit Parameters to Data

$$\mathcal{P} = (G_o, G_1, m)^T \quad \underset{\mathcal{P}}{\text{minimize}} \quad \mathcal{F}(Y_{mdl}(\mathcal{P}) - Y_{obs})$$
$$\text{subject to} \quad \mathcal{P} \in \Omega_{\mathcal{P}}$$

Treatment 6: Fitting Parameters
Treatment 1: Fit Algorithm (again)
Treatment 7: Response Variable

Step 3. Extract Dominant Stress Signals and Performance from 2,304 Assumption Sets (AS)

f) Soil Water Stress

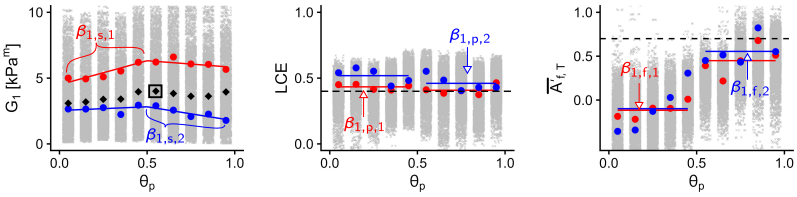
$G_1 = \beta_{o,s,i} + \beta_{1,s,i} \cdot \theta_p$
Acceptable: $|\beta_{1,s,i}| \geq 0.4$

g) Predictive Performance

$\beta_{o,p,i} = \overline{LCE}$
Acceptable: $\beta_{o,p,i} \geq 0.4$

h) Functional Performance

$\beta_{o,f,i} = \overline{A'_{f,T}}$
Acceptable: $\beta_{o,f,i} \geq 0.7$



AS 1
AS 2
PMOC Fit for Single AS
Median G_1 for θ_p bin
Stress or Performance Signal for single AS
Acceptable Performance Threshold

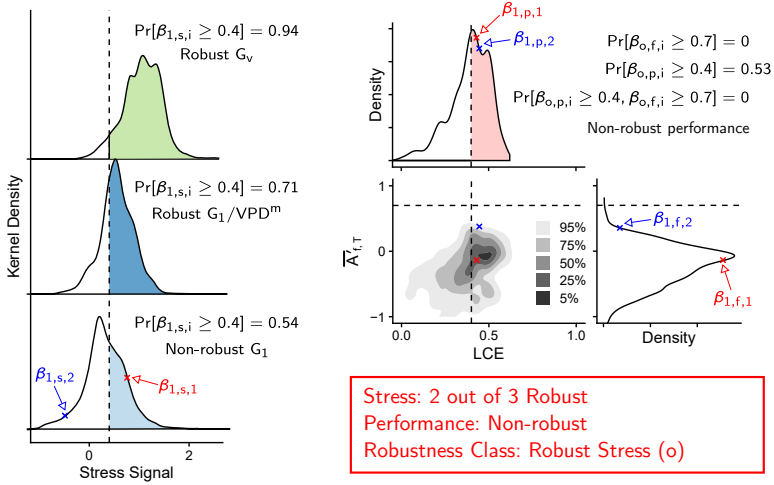
Step 4. Apply Robust Soil Water Stress Framework

i) Robust Stress (o) Criteria

70% of AS jointly exceeding practical slope threshold for at least 2 of 3 plant parameters

j) Robust Performance (+) Criteria

70% of AS jointly meeting predictive and functional performance



Stress: 2 out of 3 Robust
Performance: Non-robust
Robustness Class: Robust Stress (o)